Space Weather Forecast

Issued on Friday, 08 September 2023 at 01:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Moderate-class flares (R1-R2 radio blackouts).

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Solar activity has been Moderate in the past 24 hours with several Common-class flares and one Moderate-class flare. There are currently seven sunspot groups on the visible disc. Two of these, one in the west and one in the east, are large and showing some growth and magnetic complexity. Two other sunspot regions are emerging in the northeast, and have shown some activity and growth. The other regions are relatively small and simple.

There have been multiple Coronal Mass Ejections (CMEs) in the past 24 hours. Two were observed over the eastern limb during the UTC morning, but are considered to be far-sided and not posing a threat to Earth. A faint partial halo CME was observed early UTC afternoon, but again this is thought to far-sided also. A large eruption was observed on imagery near the two sunspot regions in the northeast, with analysis pending on any Earth-directed impacts

Solar Wind / Geomagnetic Activity: Solar wind parameters were perhaps indicative of a weak connection with a coronal hole high speed stream (HSS). The solar wind speed was slightly elevated initially but has slowly declined to ambient levels. The Interplanetary Magnetic Field (IMF) was weak throughout. The north-south component varied weakly. Geomagnetic activity was Quiet (Kp1-2)

Energetic Particles / Solar Radiation: No solar radiation storms were observed.

Four-Day Space Weather Forecast Summary
Solar Activity: There is a chance of Moderate-class flares throughout the period, mostly from the more complex sunspot regions.

Solar Wind / Geomagnetic Activity: There are two possible CMEs in the current forecast. The first is expected to be a glancing blow possibly arriving early Day 1 (08 Sep). A second CME is estimated to arrive late on Day 2 (09 Sep). This was tricky to analyse due to the background of other CMEs, which reduces confidence in this forecast.

We have likely already seen some influence from a weak HSS over the past day, and we could continue to see some slight enhancements at times for the next day or so, with Earth possibly only on the edge of the HSS influence. Another weak HSS could see slight enhancements occur on Days 2 to 4 (09-11 Sep). Any enhancements from coronal holes may well be muddied by expected CME glancing blows.

Geomagnetic activity is expected to be mostly Quiet to Unsettled (Kp0-3), but with a risk of Active (Kp4) intervals with any HSS or CME influence. There is also a slight chance of isolated G1/Minor Storm intervals (Kp5), this is most likely later Day 2 into Day 3 in association with the second CME arrival.

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Energetic Particles / Solar Radiation: Solar radiation storms are unlikely, with a very slight chance of an enhancement should any larger flares occur from the larger regions on the disc, especially later in the period.

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	5	10	10	5
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	50	40	40	40
Very Active	R3 to R5 X	No	5	5	5	5

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	5	5	10	10
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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